J. McConnell, More People and Places in Irish Science and Technology
ed. C. Mollan, W. Davis and B. Finucane,
Royal Irish Academy, 1990.

90-36

24 ARTHUR WILLIAM CONWAY *Mathematician, physicist and university administrator*

Born: Wexford, 2 October 1875

Died: Dublin, 11 July 1950

Family: Son of Myles and Teresa (née Harris) Conway
Married: Agnes Christina Bingham, daughter of William Bingham of Ballymena, Co. Antrim, 1903
Children: Teresa Mary, Morgan, Verna and Orlaith

Addresses:

1903–1912	100 Leinster Road, Rathmines, Dublin
1912–1920	Elsinore, Coliemore Road, Dalkey, Co. Dublin
1920–1929	Abbeyview, Coliemore Road, Dalkey, Co. Dublin
1929–1950	Colamore Lodge, Coliemore Road, Dalkey, Co. Dublin

Distinctions:
Professor of mathematical physics, University College Dublin 1901
Honorary D. Sc. Royal University of Ireland 1908
Fellow of the Royal Society, London 1915
President of the Royal Irish Academy 1937
Honorary Sc.D. University of Dublin 1938
Honorary LL.D. University of St Andrews 1938
Member of the Pontifical Academy of Sciences 1939
Honorary fellow of the Corpus Christi College Oxford 1940
President of University College Dublin 1940
President of the Royal Dublin Society 1942

Arthur William Conway entered University College, 86 St Stephen's Green, Dublin, in 1892 as a resident student and in 1897 he received the M.A. degree with first class honours in mathematical science. He then transferred to Corpus Christi College, Oxford, where in 1898 he was awarded the Junior and in 1902 the Senior University Scholarship in mathematics. In 1900 he became a junior fellow of the Royal University of Ireland. Appointed to the chair of mathematical physics at University College in 1901, he was also external lecturer at St Patrick's College, Maynooth, from 1903 to 1910, during the transition period when Maynooth was preparing for association with the National University of Ireland. He was succeeded in this lectureship by his student Eamon de Valera.

On the establishment in 1908 of the National University, with University College as one of its constituent colleges, Conway was appointed registrar of the college. He occupied this position until he became president of the college 32 years later. In spite of his teaching and administrative duties, Conway pursued scientific research until the end of his life, when he left behind papers that were published posthumously. His research was greatly influenced by the investigations of the nineteenth-century Irish mathematician Sir William Rowan Hamilton (Vol. 1, p. 36). This is seen by his interest in quaternions, on which he continued to work from 1900 until his last years, by when he had come to be acknowledged as the world's greatest authority

on the subject. It is also shown by his undertaking and accomplishing the arduous task of joint editor of the first two volumes of Hamilton's mathematical papers, the first on geometrical optics being published in 1931 in collaboration with J. L. Synge, and the second on dynamics in 1941 in collaboration with A. J. Mc Connell.

In the course of a discussion on elementary particles at a meeting of the Royal Irish Academy about 1945, Conway recalled that during his scientific life the electron had been discovered by J.J. Thomson. This discovery was a crucial point in the history of theoretical physics. Conway was to follow closely developments in atomic models and to apply his mathematical dexterity in elucidating and developing the new theories of atomic structure that were emerging. In the middle of the first decade of the present century, it was generally supposed that the atom is an electrical system having proper vibrations and that the periods of these vibrations give rise to the set of lines in the spectrum of an atom. In 1907 Conway made the bold supposition that each atom produces a single spectral line, so that the production of the spectrum is a collective effect of the atoms in a sample under investigation. This correct theory was put forward six years before the publication of the Bohr theory of the atom.

The first decades of the twentieth century were exciting for both theoretical and experimental physicists. In 1900 Planck proposed that energy is transferred discretely in integral multiples of the unit $h\nu$, where ν is the frequency of radiated energy and h is Planck's constant. Thus began quantum theory. Quantum theory and relativity provided new avenues of research for Conway.

In 1911 he showed that quaternions were especially well suited to express results in special relativity and to lead to new theorems. When later Dirac proposed his relativistic theory of the electron and Eddington his theory of protons and electrons, Conway expressed the four-by-four matrices employed in these theories very simply in quaternion form.

When the Bohr theory of the atom was extended by Sommerfeld and Wilson, Conway applied their quantum theory to show how the Zeeman triplet effect could be explained. He also showed how one could account for the ordinary spectrum of ionised helium and the s-term of orthohelium or parhelium, and could provide the correct value of the ionisation potential.

Immediately after the publication in 1926 by Uhlenbeck and Goudsmit of their paper on electron spin, Conway wrote a paper on the dynamics of a spinning electron. In this he provided a quantum mechanical theory in which the electron is regarded as a uniform rotating sphere that describes an orbit around a fixed nucleus. Then in 1927 he applied the de Broglie–Schrödinger wave mechanics, which he called 'undulating theory', to two-electron orbits and obtained the Rydberg form of series terms.

Conway was a man of genial disposition and with a boyish sense of humour. His university lectures were well ordered and were delivered with great speed. With the help of related textbooks one could build on his lectures to acquire a deep knowledge of the subject matter. When you heard him lecture on Hamiltonian mechanics or on some other topic to which he had made a personal contribution, he infused enthusiasm. He was admired and respected by his students and in particular by de Valera, who as taoiseach often sought his advice on academic matters.

Having spent his boyhood near the Wexford coast, Conway had a love of the sea and during most of his life he lived on the shore of Dublin Bay. He was a strong swimmer and enjoyed sailing. He was hospitable and, if you called unexpectedly during the evening, you could be sure of a warm welcome.

Further reading:

James Mc Connell (ed.), *Selected papers of Arthur William Conway* (Dublin, 1953).

James Mc Connell
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